

A New Species of *Trocholejeunea* (Hepaticae: Ptychanthoideae) from Meghalaya, Eastern Himalayas, India

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A new species, *Trocholejeunea meghalayensis* Singh & Nath, is described and illustrated from the rainforest of Meghalaya in the Eastern Himalayas. It differs from other species by its larger shape and size of leaves, leaf lobules, presence of 5–8 small, 1 celled long teeth on free margins of lobules with hyaline papillae and suborbicular-reniform, large as well as wider underleaves.

Key words: Hepaticae, India, new species, *Trocholejeunea*.

The Meghalaya literally means “Abode of Clouds” lies 24°58’–26°08’N and 89°47’–92°50’E and is considered to be the richest rainforest of the East Himalayan biodiversity hot spot. The province is also known for the Cherrapunji and Mawsynram which is the rainiest place in the world, where as much as 1633 mm of rain in mid monsoon months (July–August) is not unusual. This province exhibits diverse microclimate, temperature, habitat, environment, humidity and rainfall, which favors luxuriant growth and development of moist rain loving plants particularly bryophytes. These variable factors have led this province to be a center of speciation. Thus large numbers of threatened taxa and new species might be found in this region. Considering the above facts, an extensive exploration study was made in 2000, which discovered different populations of a new species belonging to the genus *Trocholejeunea* in Meghalaya. In India the genus *Trocholejeunea* Schiffn. was first described by Mitten (1861) from Sikkim and

Khasi Hills under the name of *Lejeunea infusca* Mitt. It was Schiffner (1932) who first placed *Trocholejeunea* Schiffn., at generic rank. Verdoorn (1934a, 1934b) transferred *L. infusca* and *Brachiolejeunea pluriplicata* Steph., to the genus *Trocholejeunea* as *Trocholejeunea infusca*. Thereafter, *Trocholejeunea* with its allied genera *Brachiolejeunea* (Spruce) Schiffn. and *Frullanoides* Raddi were treated by Mizutani (1962), Gradstein (1981), Wu (1982), Van Slageren (1985), Awasthi and Srivastava (1988) and Singh et al. (2005). Awasthi and Srivastava (1988) described *T. sandvicensis* (Gott.) Mizut. from the Western Himalayas; *T. infusca* (Mitt.) Verd. from Sikkim and West Bengal. Mizutani (1989), in his notes on three species of the genus *Trocholejeunea*, described *T. infusca* from Sikkim, Darjeeling, Khasi and Jaintia Hills and *T. sandvicensis* (Gott.) Mizut. from Mussoorie, Madras and Sikkim. Thus in previous works only two species of the genus *Trocholejeunea* are known to occur in the

Indian territory. During the study for preparation of a hepatic flora of Meghalaya a new species of the genus has been discovered, which is named *Trocholejeunea meghalayensis* Singh & Nath. Taxonomic observations, linedrawing illustrations with distribution pattern of the new species are provided in present contribution.

Materials and Methods

Epiphytic and different pure populations of plant specimens were collected in the month of July 2000 from Mawkadiang forest in Nongstoin which is a heavily moist and rainy region of the West Khasi Hills, Meghalaya. The specimens were critically examined. The line drawing illustrations were made with the help of Camera Lucida (Olympus Tokyo- 203954). The voucher specimens of taxa have been procured in the Bryophyte Herbarium, National Botanical Research Institute, Lucknow (LWG).

Taxonomic observations

***Trocholejeunea meghalayensis* Singh & Nath, sp. nov.** [Figs. 1–11]

Trocholejeunea meghalayensis Ajit P. Singh, nom. nud., Studies on Liverworts (Bryophyta) of Khasi and Jaintia Hills: Meghalaya, TROPICOS 193, pl. 59 (2002).

Planta major, caulis ad 30–35 mm longus, cum foliis 3.0–3.5 mm latus, folia caulina imbricata, dorso caulem 1.88–2.00 mm longa, 1.50–1.75 mm lata. Lobulus in situ oblongus-triangularis, carina oblique adscendens, margine supero curvato, minute 5–8 dentato. Amphigastria caulina suborbicularis-reniformia, maxima, caule quintuplo latiora (1.13–1.23 mm lata, 0.78–0.83 mm longa) breviter transverse-subsinuatum inserta.

Plants large, blackish brown or black-brownish green, 30–35 mm long and 3.0–3.5 mm wide including leaves, prostrate-procumbent, robust, forming loose tuft populations, irregularly branched, branching intercalary. Stems cylindrical, soft, in cross

section 0.26 × 0.30 mm diameter and 12–13 cells across; cortical cells in 26–30 longitudinal rows of cells, cells larger, 20–27.5 × 22.5–27.5 μm, quadrate-pentagonal in shape, slightly thick walled; medullary cells in 75–85 (numerous) longitudinal rows of cells, 20 × 20–30 μm, quadrate-pentagonal in shape, slightly thick walled, trigonous; ventral merophytes of stem 7–9 cells wide. Rhizoids few, pale brown. Leaf lobes imbricate, obliquely-subobliquely, widely spreading, ovate-oval, slightly squarrose, 1.88–2.00 mm long and 1.50–1.75 mm wide; postical margin straight up to the end of lobule keel; long axis of lobules inflated and parallel with lobes; margin entire or recurved with subrounded to obtuse apices; leaf marginal cells smaller, 12.5–15 × 12.5–20 μm, rectangular-pentagonal, thin or slightly thick-walled, trigonous; median cells 25–30 × 37.5–42.5 μm, penta-hexagonal, slightly thick-walled; trigones triangular with intermediate thickenings; basal cells 25–30 × 42.5–50 μm, hexagonal, thin or slightly thick-walled; trigones triangular with intermediate thickenings; cuticle smooth. Leaf lobules involute, 1/2–2/3 of lobe length, 0.95 mm long and 0.40 mm wide, oblong-triangular; apex oblique, free margin with 5–8 teeth, each tooth 1 cell long with hyaline papillae; free margin slightly auriculate at base; keels straight. Underleaves wider than length, 0.78–0.83 mm long and 1.13–1.23 mm wide, imbricate, obliquely spreading, subreniform, medially and apically wider, narrowed at base; margin entire; apex recurved, sinuately notched; insertions transverse to subsinuate. Fertile plants not seen.

Ecology: Plants grow epiphytically on bark in association with *Ptychanthus striatus*, *Frullania wallichiana* and *Cheilolejeunea* species at 1650 m (4900 ft.) in elevation.

Range: Endemic to India (only known from the type locality).

Specimens examined: INDIA; Meghalaya, East

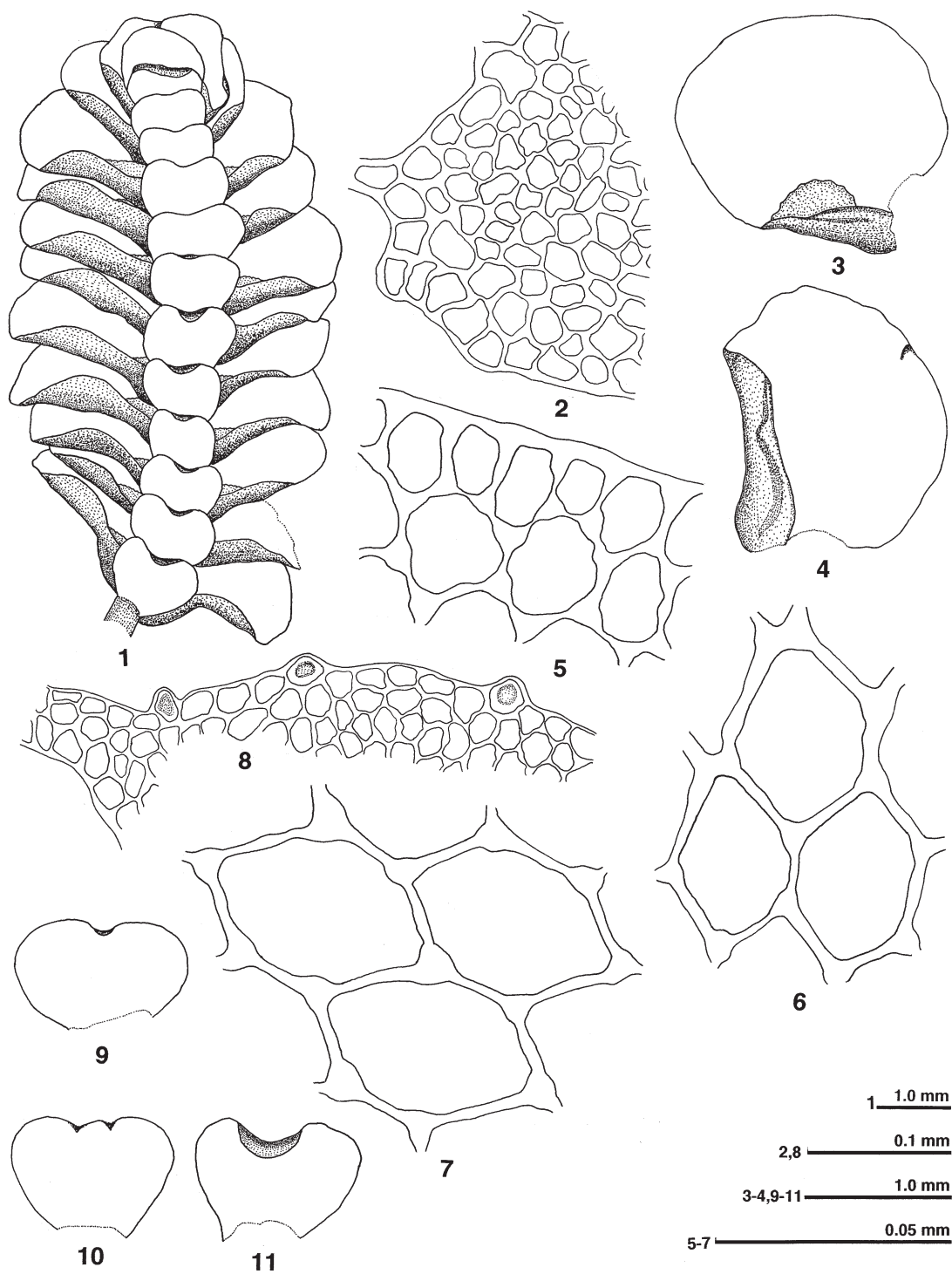


Fig. 1–11. *Trocholejeunea meghalayensis* Singh & Nath (LWG 208657). 1. Plant ventral view. 2. Portion of cross-section of stem. 3–4. Leaves. 5. Leaf marginal cells. 6. Leaf median cells. 7. Leaf basal cells. 8. Leaf lobule. 9–11. Underleaves.

Table 1. Comparison among *Trocholejeunea meghalayensis* and the related species in morphological characters

Characters	<i>T. infuscata</i>	<i>T. sandvicensis</i>	<i>T. meghalayensis</i>
Plant color	brown or dark brown	olive green-olive brown	blackish brown-brownish green
Stem	20–30 mm long, 1.1–1.8 mm wide with leaves, in cross-section stem 0.15–0.18 mm diameter	10–30 mm long, 1.5–1.8 mm wide with leaves, in cross-section stem 0.20–0.25 mm diameter	30–35 mm long, 3.0–3.5 mm wide with leaves, in cross-section stem 0.26–0.30 mm diameter
Ventral merophytes	6–7 cells wide, cross-section of stem 9–11 cells across	4–6 cells wide, cross-section of stem 8–9 cells across	7–9 cells wide, cross-section of stem 12–13 cells across
Stem cortical cells	20–23 longitudinal rows of cells, thin walled	13–17 longitudinal rows of cells, thin walled	26–30 longitudinal rows of cells, thin walled
Stem medullary cells	50–54 longitudinal rows of cells, thin walled, as large as cortical cells	35 longitudinal rows of cells, thin walled, smaller than cortical cells	75–85 (numerous) longitudinal rows of cells, thin walled, as large as cortical cells
Leaf lobes	imbricate, obliquely spreading, obliquely ovate, 0.8–1.0 mm long, 0.50–0.80 mm wide, apices obtuse, more or less incurved, margins entire	closely imbricate, widely spreading, squarrose when moist, ovate, 0.75–0.85 mm long, 0.65–0.75 mm wide, apices rounded, margins entire	imbricate, obliquely-subobliquely, widely spreading, slightly squarrose, ovate, 1.88–2.00 mm long, 1.50–1.75 mm wide, entire or recurved margins with rounded-subobtuse apex
Leaf marginal cells	10–12 × 8–10 μm	18–25 × 10–15 μm	12.5–15 × 12.5–20 μm
Leaf median cells	25–32 × 20–25 μm, thin walled, trigones large, intermediate thickenings few	25–37 × 25–30 μm, thin walled, trigones medium, triangular, intermediate thickenings few, small	25–30 × 37.5–42.5 μm, slightly thickened, trigonous
Leaf basal cells	50 × 25 μm	50 × 35 μm	25–30 × 42.5–50 μm
Leaf lobules	triangular or ovate, 2/5 as large as the lobe, apex obliquely truncate with 2 small teeth, tooth 1–2 celled, free margins somewhat auriculate at base, keels straight or slightly arched	semicircular or ovate, 1/2 as large as the lobe, inflated along the keels, free margin with 3–4 teeth, tooth small, 1–2 celled, keels sinuate somewhat auriculate at base, keels straight or slightly arched	oblong-triangular, 1/2–2/3 as large as the lobe, inflated along the keels, free margins with 5–8 teeth, tooth small, 1 celled with hyaline papillae on each tooth, keels straight
Underleaves	imbricate-approximate, rotund, 0.40–0.50 mm long, 0.65–0.90 mm wide, margins narrowly but strongly recurved, insertion deeply sinuate	closely imbricate, obliquely to widely spreading when moist, reniform, 0.30–0.35 mm long, 0.50–0.60 mm wide, margins narrowly recurved or flat, insertion sinuate	imbricate, subreniform, 0.78–0.83 mm long, 1.13–1.23 mm wide, subobliquely, margins entire, apex notched or slightly-deeply incurved, insertion subsinuate
Sexuality	dioicous	autoicous	fertile plants not seen

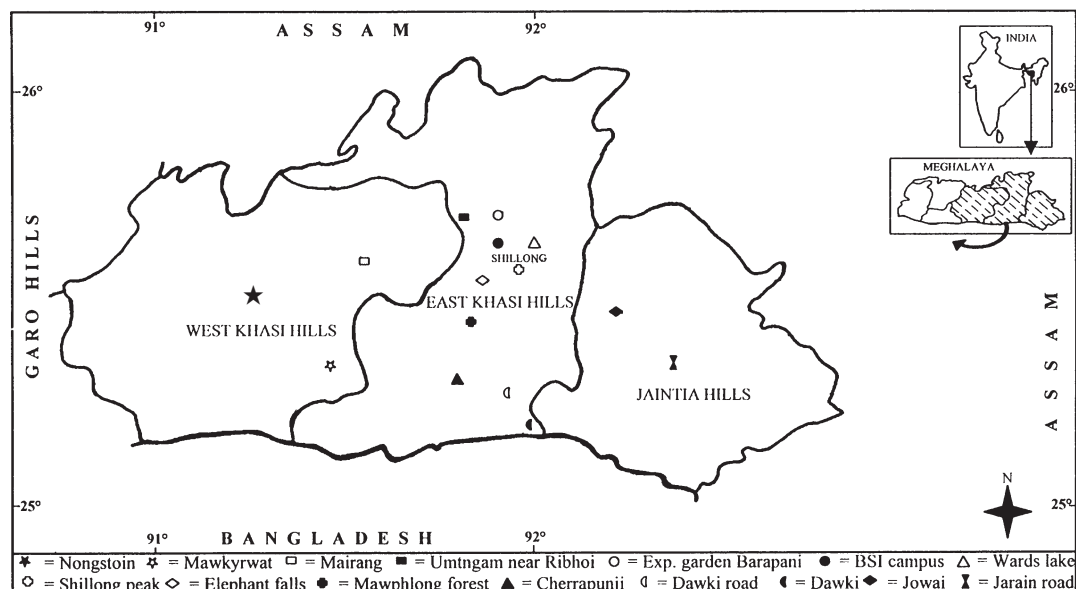


Fig. 12. Map showing distribution of *Trocholejeunea meghalayensis* Singh & Nath (★) in Khasi and Jaintia Hills, Meghalaya, India.

Khasi Hills, Nongstoin, Mawkadiang, 17 July 2000, A. P. Singh 208657-B (holotype), A. P. Singh 208658-A (LWG).

Discussion

Trocholejeunea meghalayensis Singh & Nath is distinct in having wider (3.0–3.5 mm wide) plants, leaf lobes 1.88–2.00 mm long and 1.50–1.85 mm wide, antical margin convex, postical margin straight up to end of lobules with subrounded to obtuse apex; leaf lobules free, margin with 5–8 teeth, tooth 1 cell long with hyaline papillae at base; underleaves wider (1.13–1.23 mm) than length (0.78–0.83 mm), subreniform, narrowed at base, margin entire with incurved and notched apices. Recently, Mizutani (1989) described *T. infuscata* (Mitt.) Verd., and *T. sandvicensis* (Gott.) Mizut., from Eastern and Western Himalayas, India. *Trocholejeunea meghalayensis* apparently approaches these two species morphologically. But *T. infuscata* differs from *T. meghalayensis* in having narrower (1.1–1.8

mm) plants, nonsquarrose, 0.8–1.0 mm long and 0.5–0.8 mm wide leaf lobes, postical margins incurved near lobule apex, lobules free margin with 2 small 1–2 celled long teeth, underleaves rotund, margins narrowly but strongly recurved throughout. Moreover, *T. sandvicensis* also differs from *T. meghalayensis* in having narrower (1.5–1.8 mm) plants, medullary cells of stem smaller than the cortical cells, leaf lobes smaller (0.75–0.85 mm long and 0.65–0.75 mm wide), leaf lobules free margin with 3–4 small teeth, underleaves smaller (0.30–0.35 mm long and 0.50–0.60 mm wide) and margins narrowly recurved. Another species, *T. crassicaulis* (Steph.) Mizut., was also described by Mizutani (1989) from Philippines, Borneo and New Guinea. But this species differs from *T. meghalayensis* in having narrower (1.0–1.3 mm) plants, 11–20 longitudinal rows of stem epidermal cells and free margin of lobules nearly smooth or without any tooth. The plants exhibiting such enormous distinct features in each individual of

different populations growing in Meghalaya are determinative for new taxon. Thus the specific name of *T. meghalayensis* is based on the name of the locality of its occurrence. Comparative characters of most allied Indian species of the genus *Trocholejeunea* are provided in Table 1 and distribution of *T. meghalayensis* in Meghalaya is also provided in Fig. 12.

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ヒマラヤ東部に位置するインドのメーガーラヤ州の採集品から苔類ゴヘイゴケ亜科の新種 *Trocholejeunea meghalayensis* Singh & Nath を記載, 図解した. 本種はヒマラヤに産する *T. infusata* (Mitt.) Verd. と *T. sandvicensis* (Gott.) Mizut. とは,

葉と葉の小裂片が大きく, 小裂片の縁に一細胞からなる鋸歯が5–8あること, 円形—腎臓形の腹葉は長さと同幅である点などで異なる.

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